STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

C. HEIDI GRETHER
DIRECTOR

April 21, 2017

VIA E-MAIL and U.S. MAIL

Mr. L. Chase Fortenberry, P.G.
Manager – Environmental Engineering, Environmental Affairs
Georgia-Pacific LLC
133 Peachtree Street, NE
Atlanta, Georgia 30303

Dear Mr. Fortenberry:

SUBJECT: Michigan Department of Environmental Quality Comments for OU5 [Operable Unit 5] Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Area 2 Draft Feasibility Study, Revision 1, dated October 31, 2016, Prepared by Amec Foster Wheeler, Environment & Infrastructure, Inc.

The Michigan Department of Environmental Quality (MDEQ) has prepared these comments based on our review of the above referenced document in addition to ongoing discussions with the United States Environmental Protection Agency (USEPA), and Georgia-Pacific. The MDEQ understands that the USEPA has conditionally approved this document pursuant to Section X(39)(b) of the Administrative Order by Consent.

Additionally, the MDEQ supports the positions presented in the Natural Resource Damage Assessment (NRDA) trustees' letter dated February 3, 2017, and their e-mail dated February 14, 2017, "Conceptual Design Assumptions and Considerations." The MDEQ concurs with the NRDA trustees that the long-term stability and effectiveness of the river channel and floodplain connectivity are inherent in achieving the long-term goals of the remedial action to keep the channel in place and prevent additional polychlorinated biphenyl (PCB) loading into the river. A Natural Channel Design (NCD) alternative would ensure long-term remedial effectiveness, provided such an alternative would be designed to provide sufficient bankfull floodplain capacity to minimize the risk of relying on enforcement of both timely bank erosion monitoring and timely implementation of corrective actions to address any bank treatment failure in perpetuity, given the choice to isolate contaminated material in perpetuity. Dissipating flood energy within Area 2 would also minimize the transfer of energy downstream that otherwise could result in excessive bank erosion and channel bed scour in Area 3.

MDEQ's review of the document has identified the following major concerns. In addition, detailed comments regarding the report are provided as an enclosure to this letter.

- The proposed Area 2 Feasibility Study (FS) conceptual alternatives mainly consider channel cross section at bankfull flow or less. However, much of the desired channel stability would only come from consideration of floodplain capacity and energy dissipation above bankfull flows. The three FS options do not provide a stable channel configuration, as portions of the river in Area 2 will be incised. Any natural river system requires benching and floodplain access above bankfull, which necessitates additional contaminated sediment and floodplain material removal in many areas across Area 2.

- Downstream areas (between Knife Blade Island and the dam) will be incised and are planned to have more robust joint plantings (rock) to deal with the extra energy. This approach is not NCD but a means of making incised channels look more natural. In the end, the State of Michigan sees longer term success with a remedy that results in natural channel design including benching and floodplains along the entire length of the reach.

- At a conceptual level, it is not clear how the upstream section of Area 2 will be constructed during remedy implementation. The current conceptual plan is to elevate the riverbed in order to set the bank elevations at the bankfull flow. In order to accomplish this task, the riverbed will need to be elevated over a substantial distance. The document does not convey how it will be possible to engineer such a riverbed and concurrently have the new slope be consistent with that of a "C" type channel.

- As discussed in our collaborative session in Lansing on September 9, 2016, the northern portions of the floodplain contain higher concentrations of PCBs than the southern areas. As such, the FS should indicate and future plans should endeavor to find ways to encourage flooding in southern areas (as opposed to flooding in northern areas) and limit the creation of erosional conditions to the north.

- The concepts presented in the FS do not presently follow the structure or intent of the Stream Functions Pyramid. The ecological uplift associated with Natural Channel Design elements and remedial actions should be quantified according to the hierarchy of the Stream Functions Pyramid for the evaluation of options and to determine the future benefit of the selected option.

- The Superfund process is not required to address issues related to restoration. However, a stable channel is an integral part of the long-term success of the remedy. NCD and all of its elements can achieve a stable

channel and assure long-term success. All the project parties should work collaboratively to find a way to integrate the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and restoration processes. If a CERCLA remedy is implemented with limited restoration components, the system will be lacking the necessary function. It has been the shared pursuit of attaining river function through NCD, in addition to cleanup goals, that has motivated the state of Michigan to participate cooperatively on the project to date.

The comments in the associated enclosure cover the key issues identified by the MDEQ review. The MDEQ appreciates the opportunity to have participated in the many collaborative sessions leading up to the submission of the revised FS, and to have reviewed and commented on this document. If there are any questions in regard to the MDEQ's comments related to the review of the document, please contact me at 517-284-5069; bradleyj1@michigan.gov; or MDEQ, Remediation and Redevelopment Division, P.O. Box 30426, Lansing, MI 48909-7926.

The MDEQ looks forward to continued progress for Area 2.

Sincerely,

John Bradley
Acting Unit Supervisor
Geology and Defense Site Management Unit
Superfund Section
Remediation and Redevelopment Division
517-284-5069

Enclosure

cc/enc: Ms. Cynthia Draper, Amec Foster Wheeler
Dr. Keegan Roberts, CDM Smith
Ms. Rebecca Frey, USEPA
Mr. James Saric, USEPA
Mr. David Kline, MDEQ
Ms. Kristi Zakrzewski, MDEQ

Document:	Kalamazoo Area 2 Revised FS			
Comment Author:	**MDEQ**			
Comment #	**Page**	**Section and paragraph**	**If applicable, specific quotation from text**	**Comment**
General Comments				
1	---	---	---	MDEQ would like to receive red-line versions of revised reports in the future.
2	---	---	---	The report should indicate that bank materials are separate and unique between floodplain and instream sediments. Criteria for bank material have not been developed, and it is clear that preventing bank material erosion is key to achieving our goals. As such, the future remedy will need to result in effective separation of the bank material from the aquatic/instream system. Uncertainties regarding the effectiveness of the proposed remedies, in achieving this goal, exist. The future success of the proposed remedies can only be confirmed through an adequate and robust Long-Term Monitoring (LTM) program.
Specific Comments				
1	ES-6	Nature and Extent of Sediment Contamination	The distribution of PCBs may be revised prior to remedial action based on predesign sample results.	Bench samples should meet 0.33 milligrams per kilogram (mg/kg) criteria, as they will be inundated more regularly than the floodplain.
2	ES-7	Risk Assessment Summary	The TBERA did not address aquatic receptor uptake when the floodplains are inundated by flooding because the frequency and length of flooding is not of sufficient duration.	The Feasibility Study (FS) states "Per Area 4 SRI, the USEPA defined sediment in Area 4 as deposited material within the area that is inundated for at least 30 consecutive days per year." Remove the reference to 30 days of inundation, as the criteria for determining sediment versus soil has not been formally established. Also, the report did not address aquatic receptors because the dam is being removed, not because an approved analysis indicated that inundation of the floodplain is not of sufficient duration. The effectiveness of the proposed remedies is not certain, and outcomes have not been guaranteed as the remedies look to minimize cleanup costs. As such, the effectiveness of any implemented remedy will need to be verified through an adequate monitoring program.
3	ES-8	MEDIA OF CONCERN	Surface-area weighted average concentrations (SWACs) of sediment in the main channel of Area 2 are below the preliminary remediation goal (PRG) of 0.33 mg/kg.	Identify or reference the SWAC calculation method (e.g., stream tubes, Theissen polygons, etc.) that was used when developing SWACs for the various areas. Also, discuss or reference the inherent strengths and weaknesses (e.g., ability to capture edge effects) of the chosen method.
4	ES-11	Table ES-1	Enhanced MNR long term effectiveness.	If Monitored Natural Recovery (MNR) is determined to be effective in the long term, then the table should be revised to show enhanced MNR as also being effective in the long term. EMNR is an "enhanced" version of MNR. Furthermore, for Area 2, MNR should not be identified as effective when it is a stand-alone technology, as the data do not indicate sufficient rates of decline in fish tissue contaminant concentrations; hence the need for the remedial alternatives being evaluated in this document.
5	ES-13	Channel Realignment	Under this scenario, a remedial alternative allowing for continual bank erosion and channel movement would require removal of the contaminated sediment and soil within the floodplain to the sediment PRG (0.33 mg/kg).	The MDEQ agrees any material that could potentially be eroded should be assigned 0.33 mg/kg criteria. The long-term success of the remedies proposed in this FS document is dependent upon preventing the contaminated floodplain materials from entering the river system. If sufficient safety factors are not incorporated into the remedial design, then frequent monitoring should be conducted. Any monitoring effort should include regularly scheduled inspections (e.g., yearly), as well as inspections following flow events above a pre-determined flow threshold. Revise the text accordingly.
6	ES-17	Bank Soil	....and (2) additional bank buffer excavation to an (RAL) of 10 mg/kg or 5 mg/kg total PCBs within a 10-foot wide zone from the edge of the realigned channel (including bank treatment width).	The approach proposed in the alternatives seeks to minimize the work conducted to implement the remedy. There are many uncertainties related to this approach. The FS should be clear about these uncertainties, and should acknowledge the resulting need for frequent and long-term monitoring of remedy effectiveness. Revise the text accordingly.

7	ES-20	A-3: Capping, Channel Realignment, Gun River Excavation, Targeted Excavation on Knife Blade Island, ICs, and LTM	Cap soil is assumed to mostly consist of clean cut material recovered from the channel realignment.	The report should indicate that clean cut material will be considered for use ONLY if concentrations are below 1 part per million (ppm) using the sampling design developed during the Remedial Design. This same 1 ppm threshold for reusing excavated materials was utilized at the Otsego Township Dam Area Time-Critical Removal Action (TCRA). Revise the text accordingly.
	1-2	1.2 SITE HISTORY	Nonpaper sources of PCBs have also been identified throughout the watershed.	The report should make clear that releases from the mills are responsible for the vast majority of polychlorinated biphenyls (PCBs) within the system. A simple graphic with fish tissue and surface water will help to make the point. See the attached figures from the last MDEQ LTM report.
	1-14	1.3.2.5 Fish Tissue Trending	In 1999 and 2009, split samples of fish were analyzed by two laboratories. For consistency, concentrations analyzed by Northeast Analytical, Inc. (NEA) were chosen to represent concentrations in fish during these two years.	For document clarity, discuss a.) why NEA samples were chosen to be representative and b.) the impact of the lab switch on data uncertainty.
	1-17	1.3.2.5 Fish Tissue Trending	Recent TCRA events around the former Plainwell Dam and Plainwell No. 2 Dam areas, just upstream of Area 2, may contribute to the lack of a trend in total PCB concentrations for SMB fillet. Based on the results observed with SMB YOY whole-body and common carp fillet tissues, the first-order model has the greatest statistical strength for the observation of PCB concentration trends in representative fish species. The adult SMB fillet data are too variable to discern a statistically significant decrease at this time. The observed rates of decreasing PCB concentrations in fish tissue are the result of several factors occurring simultaneously. These temporal and physical factors include, but are not limited to, changes in PCB transport and loading to Area 2, flood events, resuspension events from removal activities, changes in fish habitat, variable lipid content in fish, and natural recovery processes.	As pointed out in the text, there are many factors responsible for fish trends. At this point, the impact of the TCRA on the fish trends cannot be evaluated with the existing data sets. Cause-and-effect relationships related to remedial activities should only be determined with LTM data. Revise the text accordingly.
	1-18	1.3.3 Contaminant Fate and Transport	Several factors affect the persistence and migration of PCBs within Area 2. Sources of PCBs in Area 2 are area sediments, eroding bank soils, flows from upstream and tributaries, runoff from adjacent areas, other discharges to the river, and atmospheric sources.	Other sources are small in comparison to internal sources that were released from the paper mills. Such a basic distinction should be made. The attached figures from the MDEQ LTM report are good visual indicators of the magnitude of the other sources.

	3-4	3.1.1.7 Sediment Removal	Bulleted list of sediment removal challenges.	This section focuses only on the negative consequences of doing instream remediation work, and not the many positive possible outcomes. Furthermore, activities such as capping can have similar negative consequences from implementation, but the report does not mention them. The report needs to be fair and balanced with the discussion of remedial technologies. Add discussions of the negative consequences for all of the technologies presented in the other sections.
	3-6	3.1.2.2 Monitored Natural Recovery	This deposition over time would effectively become a natural cap, which would reduce the bioavailability of the buried PCBs.	The report should point out that there is no empirical data to quantify sediment burial in the floodplain. Additionally, deposition in the floodplain is a part of a natural process that includes both deposition and erosion over time. The effects of impoundment changes following remediation are unknown, resulting in further uncertainties when it comes to the aforementioned unquantified deposition/erosion processes.
	3-6	3.1.2.2 Monitored Natural Recovery	This deposition over time would effectively become a natural cap, which would reduce the bioavailability of the buried PCBs.	The report should make clear that such a process does not alter a chemical's bioavailability but rather reduces the exposure potential. Given that many of the main concerns with floodplain exposures are to higher risk vermivorous receptors, such minimal burial becomes even less important. The report should simply remove speculative statements regarding the impact of this unquantified process.
	3-11	3.3.1 Channel Realignment	Natural channel design eliminates the need for wide buffer zones (25 to 50 feet) between the river and the floodplain that would be required for less holistically stable banks.	This is an untrue statement and should be removed. Natural channel design simply anticipates the needs of a river from a functionality standpoint at flows above and below bankfull. Any natural river system requires benching and floodplain access above bankfull, which necessitates additional contaminated sediment and floodplain material removal in many areas across Area 2. Much of this FS anticipates no natural channel design with incised channels at flows above bankfull.
	3-11	3.3.1 Channel Realignment	Incorporation of natural channel design concepts into the remedial alternatives puts the emphasis on appropriate river channel shape, location, floodplain connectivity, and bank stability, rather than on managing erosive forces that would result from more traditional channelization methods.	Natural channel design requires the incorporation of all of the following elements throughout the entirety of a design reach: bed slope, velocity/flow, width-to-depth ratio, bankfull elevation, bank slope, radius of curvature, meander pattern, connectivity to the floodplain, floodplain benching, bank treatments, instream structures, and dam removal (see page ES-13 of the Area 2 FS document). These elements cannot be implemented in an ad hoc fashion for natural channel design. The MDEQ's ultimate goal for this project is to implement true natural channel design throughout the reach. Revise the document to acknowledge that the proposed alternatives do not achieve natural channel design.
	3-14	Natural Channel Design	A tree will grow for one to two hundred years before dying and being replaced by another tree.	The current root wads being placed will likely degrade within the next 30 years. In the absence of these root wads, the riverbanks will require some form of protection to prevent erosion of the contaminated floodplain. Revise the document to address how the riverbanks will be protected against erosion from the time that the placed root wads have degraded and newly fallen trees have taken their place.
	3-16	3.3.1.2 Single Channel Using Natural Channel Design Concepts	Channel bank slopes and connectively to the floodplain either occurring naturally or through benching in the floodplain help to manage normal flow conveyance and flooding.	The MDEQ agrees that channel bank slopes and connectivity to the floodplain help to manage normal flow conveyance and flooding. These two concepts are key parts of a Natural Channel Design (NCD). MDEQ's ultimate goal for this project is to implement true NCD throughout the reach. Revise the document to acknowledge that the proposed alternatives do not achieve NCD.
	3-18	Common Channel Realignment Elements	The three options provide a stable single channel to convey the Kalamazoo River flow and bedload, share similar vertical profiles with benching to maintain floodplain connectivity, and have the same bankfull cross-sectional design basis.	Much of the design only considers channel cross-section at bankfull flow or less. Much of the desired stability would only come from consideration of floodplain capacity and energy dissipation above bankfull flows. The three options do not provide a single stable channel as portions of the river will be incised.
	ES-13	Channel Realignment	Bulleted design elements.	Provide a map showing which of the bulleted elements of NCD are used where, and provide associated discussion in the text.
	3-22	3.3.2.1 Sediment	A value of 1 mg/kg was selected because natural attenuation is expected to reduce a SWAC of 1 mg/kg to 0.33 mg/kg over time as presented in the Area 1 FS (AMEC 2014b).	The report should indicate that the main driver of Monitored Natural Attenuation (MNA) is a.) erosion of currently contaminated material through and out of Area 2 and b.) transport of cleaner material transported into this area from upstream areas. In order for MNA to be effective in the future, cleanup activities in both Area 2 and upstream areas must be effective. This can only be determined through an adequate LTM program, and the assumption of expected MNA in the document should be appropriately qualified.

	3-31	3.4.1.8 Conservative Basis for Remedial Footprint and Alternatives Development	The remedial footprint decisions have been developed in this FS based on the available SRI data sets that were collected from locations within the floodplain and the main channel that were selected during field reconnaissance based on factors such as appearance, ground surface elevation, and soil/sediment "softness" or thickness. The data are, therefore, more conservative indicators of contaminant levels and risk as compared with random, unbiased grid sampling approaches.	Data collection efforts for Area 2 were predominantly based on Transects (1993), an aligned grid and radial step-outs (2001 EPA sampling), and random sample collections within different geomorphic feature types. Therefore, it is possible that a limited number of the overall sample locations are biased toward areas of more obvious visual contamination, but most sample locations were selected through unbiased desktop exercises. As such, it is not appropriate to draw the conclusion that data are more conservative. A simple test of the various data sets would quantify the level of bias introduced, if any. The analysis should be conducted or the biased statement should be removed.
	3-34	3.4.4 Alternative 3 (A-3) – Capping, Channel Realignment, Gun River Excavation, Targeted Excavation on Knife Blade Island, ICs, and LTM	Cap soil is assumed to mostly consist of clean cut material recovered from the channel realignment.	The report should indicate that clean cut material will be considered for use ONLY if concentrations are below 1 ppm using the sampling design developed during the Remedial Design (RD). This same 1 ppm threshold for reusing excavated materials was utilized at the Otsego Township Dam Area TCRA. Revise the text accordingly.
	4-3	4.2.1 Alternative Description	Visual inspections of riverbank erosion would occur annually for the first five years after dam removal, then once every five years for the remainder of the LTM period, plus additional inspections after major storm/flooding events, as necessary.	This document is not being used to develop the detail of an effective LTM program. Details of the actual monitoring program will be developed during RD.

Area 7
Area 6
Area 5
Area 4
Area 3
Area 2
Area 1
Lake Allegan Dam
Allegan City Dam
Trowbridge Dam
Otsego Dam
Pine Creek Dam
Otsego City Dam
Plainwell Dam
Plainwell Dam No. 2
12th Street Landfill (OU4)
PLAINWELL TCRA
PLAINWELL DAM NO 2 TCRA
King Highway Landfill (OU3)
PORTAGE CREEK TCRA
HAWTHORNE MILL TCRA
Alcott Street Dam
BMP TCRA
Allied Paper (OU1)
Monarch Mill Pond Dam
Morrow Lake Dam
Willow Blvd / A-Site (OU2)
Ceresco Reservoir Dam

Legend

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Upstream
- Dams
- OUs
- River
- TCRAs
- County Border

Allegan
Kalamazoo
Calhoun

Allied Paper, Inc. / Portage Creek / Kalamazoo River Superfund Site
Long Term Monitoring

Overall Site Map

0 1 2 4 6 8 Miles

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DEQ

Prepared By: B.Bennett
Date: 04/01/2016

Figure 1.2-1

28-Kalamazoo Lake
Bluestar Highway Bridge

71-Lake Allegan Outlet
Calkins Dam

27-Lake Allegan Inlet
M-89 Bridge

22-Trowbridge Impoundment Outlet
26th Street Bridge

20-Otsego City Impoundment Outlet
Farmer Street Bridge

72-Plainwell Impoundment Outlet
Former Plainwell Dam

18-Plainwell Impoundment Inlet
US-131 Highway Bridge

75-Main Street
Main Street Bridge

74-Mill Race Outlet
Bridge Street Bridge

17-D Avenue
D Avenue Bridge

73-Portage Creek Outlet
Kalamazoo Avenue

15-Kalamazoo Avenue
Kalamazoo Avenue

83-BMP Outlet
Reed Street Bridge

12-Morrow Inlet
35th Street Bridge

55-BMP Inlet
Cork Street Bridge

13-Morrow Outlet
River Road Bridge

Lake Allegan Dam

Allegan City Dam

Trowbridge Dam

Otsego Dam

Pine Creek Dam

Otsego City Dam

Plainwell Dam

Plainwell Dam No. 2

Alcott Street Dam

Monarch Mill Pond Dam

Morrow Lake Dam

Ceresco Reservoir Dam

Legend

- Inlet-Outlet Sampling Locations
- Other Surface Water Sampling Locations
- Dams
- County Border
- River

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geog
User Community, Esri, HERE, DeLorme, MapmyIndi

Allegan
Kalamazoo
Calhoun

Allied Paper, Inc. / Portage Creek / Kalamazoo River Superfund Site
Long Term Monitoring

Surface Water
Sampling Stations

0 1 2 4 6 8 Miles

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DEQ

Prepared By:
A. Santini

Date:
10/6/15

Figure
2.1-2

34
Kalamazoo Lake

35
New Richmond

30
Lake Allegan

38
Allegan City Impoundment

37
Trowbridge Impoundment

36
Otsego Dam Impoundment

86
Pine Creek Impoundment

33
Otsego City Impoundment

32
Former Plainwell Impoundment

82
Plainwell Dam No. 2 Impoundment

63
D Avenue

62
Kalamazoo Avenue

61
Bryant Mill Pond

68
Monarch Mill Pond

29
Morrow Lake

87
Downstream of Morrow Lake Dam
(and upstream of A-Site)

31
Ceresco Reservoir

Lake Allegan Dam
Allegan City Dam
Trowbridge Dam
Otsego Dam
Pine Creek Dam
Otsego City Dam
Plainwell Dam
Plainwell Dam No. 2
Alcott Street Dam
Monarch Mill Pond Dam
Morrow Lake Dam
Ceresco Reservoir Dam

Legend

- Resident Fish Locations
- Dams
- County Border
- River

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geog
User Community, Esri, HERE, DeLorme, MapmyIndi

Allegan
Kalamazoo
Calhoun

Allied Paper, Inc. / Portage Creek / Kalamazoo River Superfund Site
Long Term Monitoring

Resident Fish
Sampling Stations

0 1 2 4 6 8 Miles

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DEQ

Prepared By:
A. Santini

Date:
10/6/15

Figure
2.2-1

Figure 3.6-1
Flow and Seasonally Adjusted Surface Water Geometric Mean Total PCBs in Summer 2014

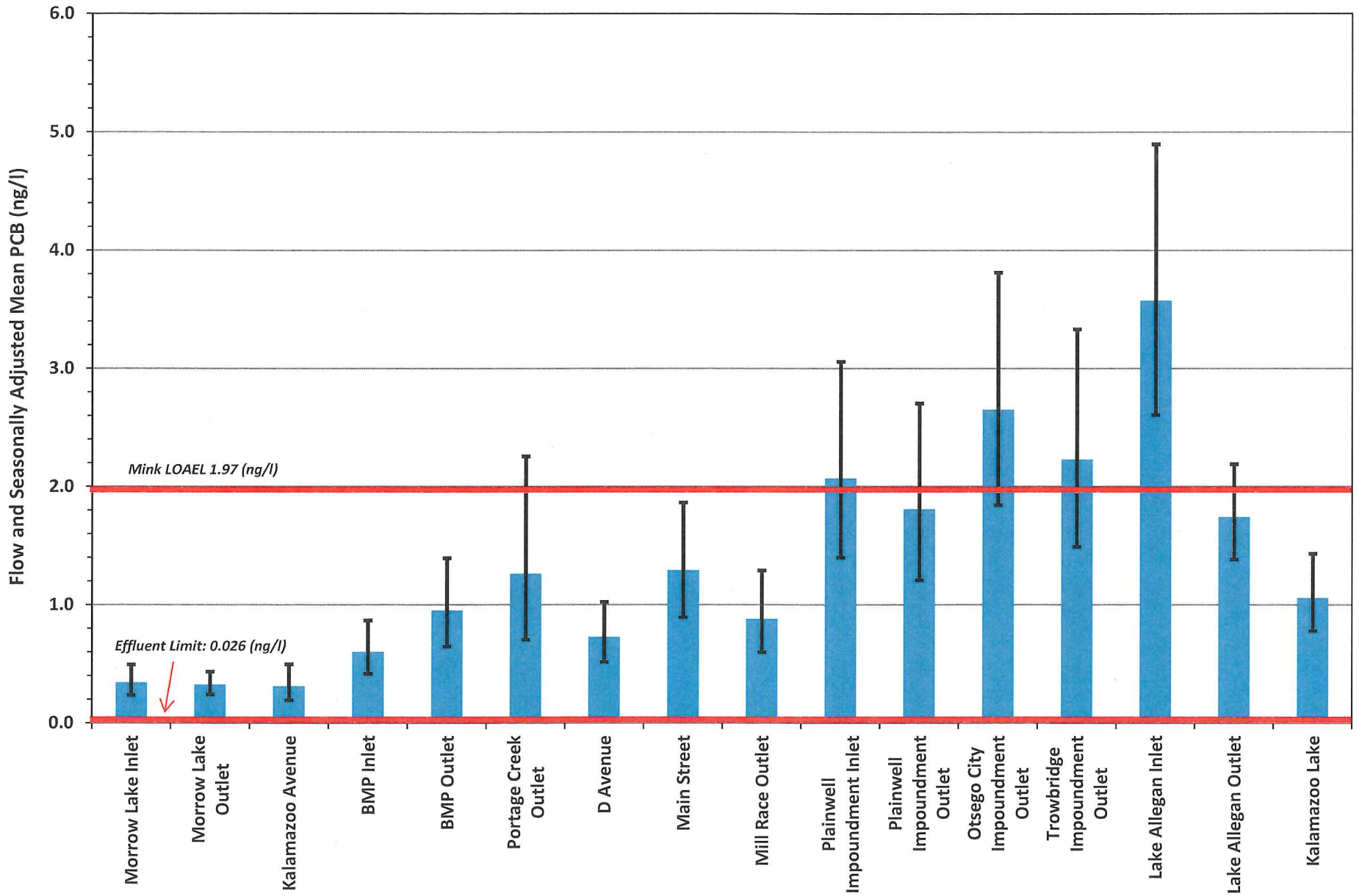

Figure 3.6-3
Current Conditions in Unadjusted and Lipid Adjusted
Mean PCB in Resident Adult Carp Fillet 2011-2012 (Adjusted to 3.65% Lipid)

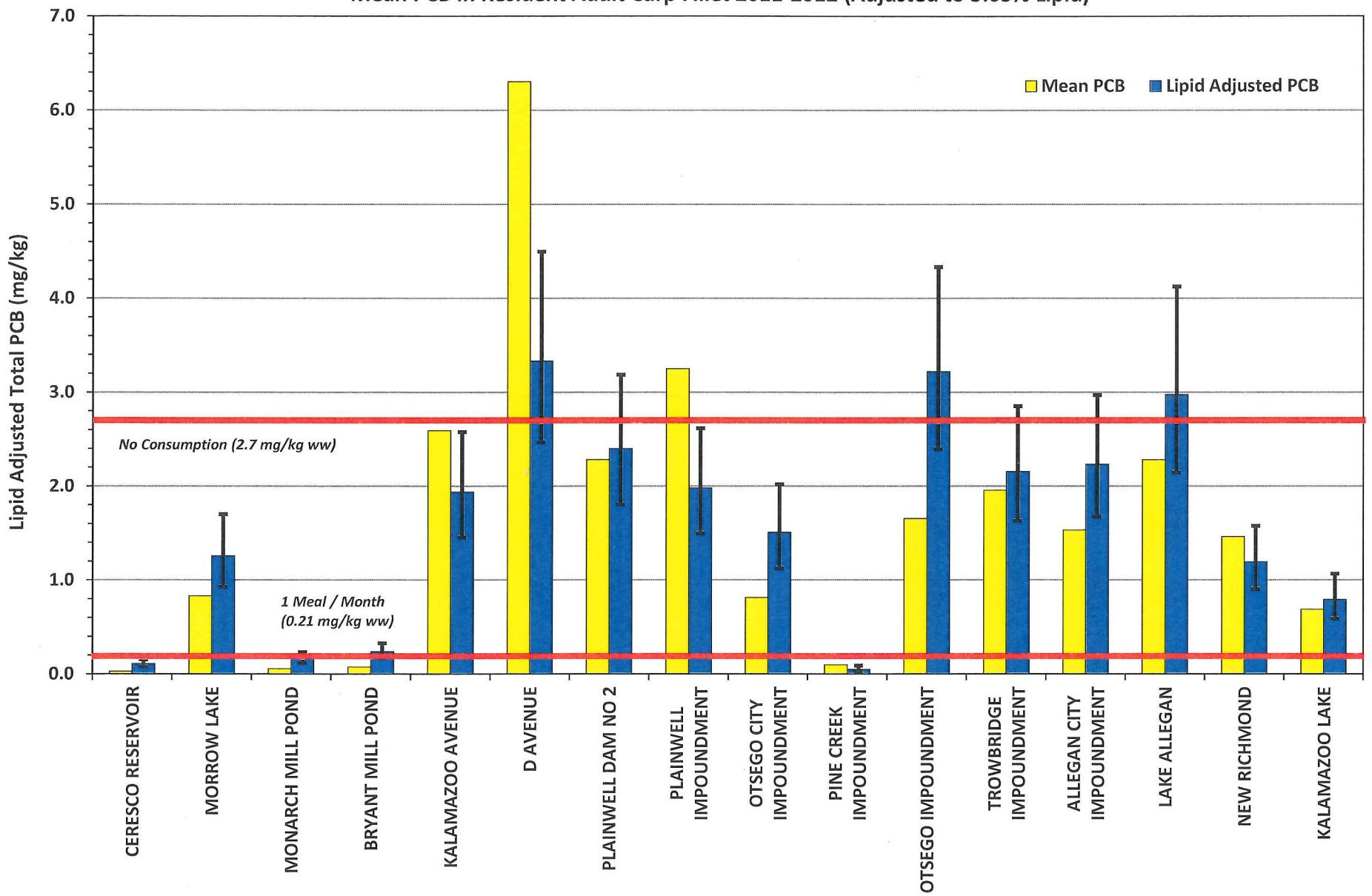

Figure 3.6-4
Current Conditions in Unadjusted and Lipid Adjusted
Mean PCB in Resident Adult Smallmouth Bass Fillet 2011-2012 (Adjusted to 3.65% Lipid)

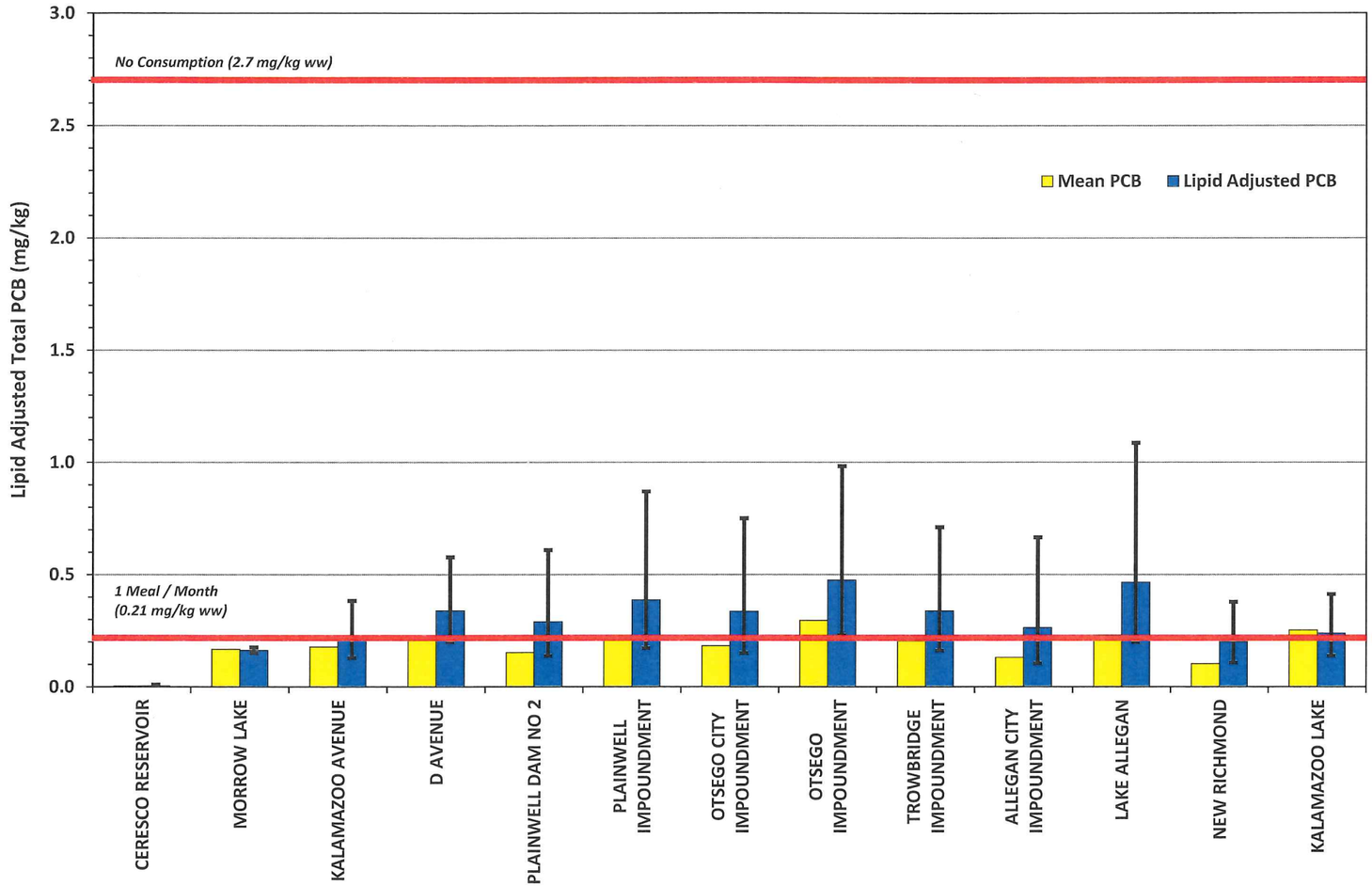

Figure 3.6-6
LTM Resident Adult Carp and Smallmouth Bass
Dioxin/Furan and Coplanar PCB TEQs (2005 WHO)